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## PRECOLUMBIAN DECORATION OF THE TEETH IN ECUADOR

WITH SOME ACCOUNT OF THE OCCURRENCE OF THE  
CUSTOM IN OTHER PARTS OF NORTH AND SOUTH  
AMERICA

By MARSHALL H. SAVILLE

PRIMITIVE personal decoration, wherever found and however practised, is a subject of interest to the anthropologist.

Man was ever vain, fond of ornamenting his person in a multitude of ways. He early learned the art of painting, tattooing, and scarifying his face and body, and pierced his ears, nose, lips, and cheeks for the insertion of ornaments of various materials and divers shapes, fondly imagining that he added to his personal appearance thereby, through which he attracted the opposite sex. One of the most singular ways in which the love of facial decoration has found expression is that in which the teeth have been operated upon, either by painting or staining, or by filing or cutting the ends into different forms,<sup>1</sup> or, further, by the insertion of foreign substances into cavities artificially cut into or through the enamel in

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<sup>1</sup> The work of von Ihering is the first general treatment of the custom of dental decoration. In his brief account of the practise of the custom among the American Indians, he confines himself to cases among tribes of modern times. Hamy was the first to present the proof of the occurrence of the custom in times anterior to the coming of the Spaniards in Latin America. He was also the first to give us examples of inlaying, as will be observed in the chronological bibliography which follows. In the present paper I do not take into consideration the filing of teeth as now practised in Brazil and other Latin American countries.

the front of the upper teeth. It is to this latter phase of dental decoration to which attention is called in this study. So far as we are aware, the type of decoration represented by the insertion of stone or metal into the teeth in the manner about to be described is not found outside of ancient America. The author has been interested in this subject for many years, having collected examples of decorated teeth in Oaxaca, Chiapas, Yucatan, and Honduras.<sup>1</sup> For the sake of comparison a brief reference will be made to some examples from Mexico and Central America, together with a list of authorities, at the end of this communication. The material from Ecuador, herewith published, has been collected in connection with the work of the George G. Heye Expedition in that country, and the specimens are now in the Heye Museum, New York.

In a communication to the International Congress of Americanists held at Vienna in 1908, in giving a brief résumé of the results of my first archeological trip to Esmeraldas, the writer said:

Another custom which we have found in Esmeraldas, and which, so far as we are aware, is not present in any other part of South America, is the decoration of the teeth by the insertion of inlays in small perforations cut in the enamel of the upper incisors. This custom of decorating the teeth was quite common in various parts of Mexico, where different settings were used. In the Mayan area, as far south as Salvador, the object most often used for the inlay was jadeite. In Mexico, for example in Oaxaca, I have found hematite used; in Vera Cruz, turquoise has been found; and in other parts, teeth with settings of rock crystal,

<sup>1</sup> I presented some notes on "Decoration of the Teeth in Ancient America" before the American Association for the Advancement of Science at the Detroit meeting in 1897. This paper was not published, partly by reason of the fact that I wished to collect more material bearing on the subject, but especially because of my long absence in Mexico on the work of the Loubat Expedition during the fall and winter of 1897-98. (See entry in the bibliography under date of 1899.) In 1901 Dr Lasch published in Vienna his paper on teeth mutilation and decoration in America. (See entry in the bibliography under this date.) Lasch mentions my account of finding teeth inlaid with hematite in Xoxo. He quotes my paragraph, "This ancient custom can now be traced from the Pueblo region of Arizona to southern Central America," and says, "Alas, Saville neglects to give his proof for the wide distribution of this custom." Dr Lasch unfortunately had not consulted several studies, entries of which I give in my bibliography, where he would have found published accounts of decorated teeth in Chiapas, Yucatan, and in Honduras and Salvador. Regarding the Pueblo region, I made the statement after having photographed a skull found by Dr Fewkes at Sikyatki, Arizona, a study of which seems to me clearly to indicate single serrations in at least three of the upper incisors and in the lower right lateral incisor.

obsidian, and a red cement, have been found. We have never heard of this custom in Colombia or Peru, but in Esmeraldas, in Atacames, skulls have been found with tiny discs of gold set into the teeth in the same manner as in Mexico and Central America, with the exception of the material. To our knowledge, among the thousands of mummies and skulls from Peru, inlaid or filed teeth have never been found, and it is a fact of very great significance in the study of the migrations of the ancient people of the west coast of Central America, and of northwestern South America.<sup>1</sup>

Since writing the above, Boman's great work on the archeology of the Andean region of Argentina has appeared,<sup>2</sup> and he has presented a skull showing filed teeth which was found in the extreme northwestern part of that republic. He furthermore refers to filed teeth being found in the neighboring part of Bolivia by Crequi Montfort,<sup>3</sup> but what I have said regarding the inlaying of teeth still holds true.

The only account from the early Spanish chroniclers which relates to the decoration of the teeth in Ecuador is found in the important work of Cieza de León. In treating of the province of Guayas in my *Antiquities of Manabi, Ecuador, Final Report*, I have cited this notice.<sup>4</sup> Before mentioning this custom, Cieza

<sup>1</sup> See entry in the bibliography under date of 1909.

<sup>2</sup> The title of Boman's great work will be found in the entry under 1908 in the bibliography. The skull described by Boman, and illustrated by both Chervin and Boman, was found in Argentina, near the arroyo of Sayate, in the province of Jujuy, not far from the Bolivian and Chilean frontiers. Sayate is in about the latitude of Antofagasta of the Chilean seaboard. The skull is that of a child of about the age of seven years; it has three of the lower incisors filed, the other being missing. The upper teeth also are missing, hence we do not know whether these were filed.

<sup>3</sup> Chervin, in his *Anthropologie Bolivienne*, after describing the Sayate skull, later treated in considerable detail by Boman, writes: "Nevertheless I found among the skulls coming from the graves of Tocarji, near Yura, province of Porco, Department of Potosi (Bolivia), analogous mutilations, less distinct, less fine, if I may say so. It consists of a division worked by two strokes of a saw, approaching a right angle, and thus separating a triangular piece, the base of which is situated on the cutting edge of the tooth, and the point directed toward the root. (See especially skulls numbered 285, pl. 81, and 314, pl. 86.) There it is a simple variation of Sayate, which has its importance in that it shows us the geographical area of these dental mutilations is very considerable in this region."—Tome III, pp. 94-95.

<sup>4</sup> See entry in the bibliography under date of 1910. Cieza de León was on the coast of Ecuador between the years 1540 and 1550, hence it is plain that the custom of inlaying the teeth with gold discs must have persisted for some time after the first coming of Pizarro in 1527.

enumerates several villages of the district, among them Colonche, Chanduy, and Chongon, towns which still exist along the coast of the region, between Manglar Alto and Guayaquil. He then proceeds: "In some of these villages the caciques and principal ones fasten bits of gold in their teeth." This undoubtedly refers to the style of dental decoration found in Esmeraldas province much farther to the north, where discs of gold were inserted as inlays into artificial cavities, as will be described later.

Bollaert, in his *Antiquarian, Ethnological, and Other Researches in New Granada, Ecuador, Peru, and Chile*, published in 1860, gives some information regarding the Esmeraldas coast which he received from M. Bourcier, formerly consul-general from France to Ecuador. He states that "large earthen vessels, containing chicha, have been disinterred, also a male skeleton, which had false teeth, secured to the cheek-bone by a wire of gold."

In his *Resumen de la Historia del Ecuador* Cevallos quotes from a report made about the coast of Esmeraldas during the early forties, to President Flores, and the statement which follows relates to a portion of the coast between La Piedra, at the mouth of Esmeraldas river, and Rio Verde, about twenty miles to the north. We translate from this account:

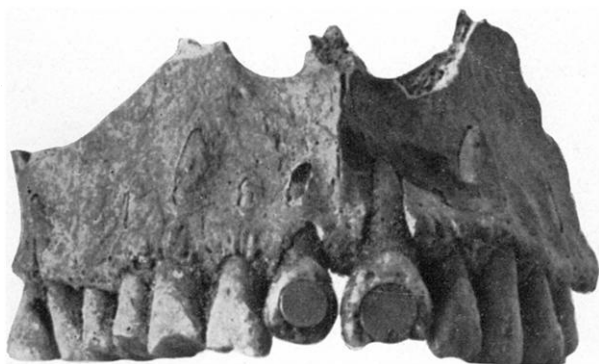
In the year 1836 the Señora María Montero de García found in opening a well in her garden a jar with the skeleton of a man; the skull was well preserved and the teeth were interlaced or intertwined with gold wire. Examining the jaws to see if the teeth were artificial, in which case the wire would have served to secure them, it was found that they were not, and that the gold served as a pure ornament or fancy of the individual.<sup>1</sup>

It seems quite probable that this official account refers to the skeleton about which M. Bourcier gave information to Bollaert. The place where this discovery was made is in the immediate neighborhood of the locality in which was found one of the examples which I brought from Ecuador last summer. It is indeed unfortunate that we have no representation of this skull to further enlighten us concerning the style of decoration.

<sup>1</sup> Volume VI, the final volume of the work of Cevallos from which we take this statement, was first published in 1873. I quote from the second edition, volume VI of which was printed in 1889.



A. SKULL WITH TEETH INLAID WITH GOLD, FROM ATACAMES, ESMERALDAS, ECUADOR.  
IN THE BRITISH MUSEUM



B. SKULL WITH TEETH INLAID WITH GOLD, FROM ATACAMES, ESMERALDAS, ECUADOR.  
IN THE HEYE MUSEUM

In the spring of 1913, a Cholo, one of the natives of Atacames, a town in the province of Esmeraldas, about eighteen miles southwest of the city of Esmeraldas, found a skeleton in a burial tube in the right bank of the Rio Atacames, just above the town. The skull was found with the teeth inlaid with gold, but the finder contented himself by breaking off the superior maxillary, throwing the rest of the skull away. When I visited the town in June of the present year for the purpose of making some excavations to supplement my former work, I obtained the fragment. The two upper middle teeth are decorated by the insertion of thin gold discs in cavities drilled or bored in the enamel of the face of the teeth, as shown in figure 56, in the drawings in plate XIX, *d*, *e*, and also in the photograph shown in plate XVI, *b*. An unusual dental feat, in addition to the decor-

ation, is found in the right middle tooth. This is not a right middle incisor, but a right lateral incisor (pl. XIX, *d*), which does not belong to the jaw but was implanted to replace the middle incisor. This is such an extraordinary feature that we must

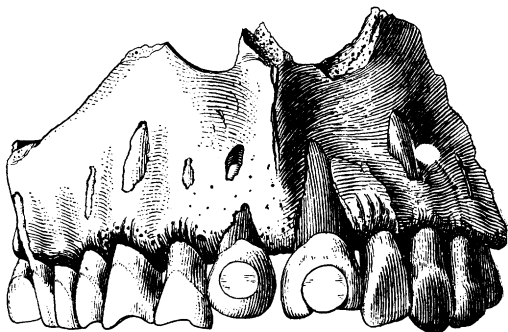


FIG. 56.—Teeth decorated by the insertion of thin gold discs.

weigh very carefully the evidence as to its having been found in the jaw. Everything is in favor of this position; indeed there is no reason to doubt that the replacement is a genuine precolumbian triumph of the ancient dentists of Atacames.

The occurrence of decorated teeth is extremely rare, very few specimens having been found, but this is not proof that the custom was not a common one in former times. The inhabitants of the little village are incapable of appreciating the archeological value of such finds, as they hold in little esteem objects of antiquity which are found in great abundance, and there is no market for

relics in this isolated place. The value of the gold inlays as bullion is very small; the owner sold the specimen for less than two dollars, and I could have obtained it for less, had I desired to follow the usual method of trade. The tooth fits perfectly into the socket, although, as a matter of course, it is not so long as the cavity, this space at the end being proof that the original tooth was replaced by the implanted one only a short time before death, otherwise the growth of the bone would have filled it.

Although I have never before seen an implanted upper tooth in ancient America, we have an example in a lower jaw which I uncovered in an excavation at Copan early in 1892. Dr Andrews, the well-known dental authority, has published a record of this find, as follows:

In the lower jaw of the skeleton was found the most interesting curiosity in the whole collection to dentists—a lower left lateral incisor that has been carved from some dark stone, and which has been implanted to take the place of one that had been lost. The tartar would seem to show that it had been worn for some time during life. This implantation antedates Dr. Younger's experiments by some fifteen hundred years.<sup>1</sup>

In another paper, Dr Andrews writes:

The most interesting dental curiosity in the collection is an implanted tooth, made of some dark stone. It was found neatly fitted in the socket of an inferior left lateral incisor, and is shaped very much like the natural tooth. That it had been worn for some time during life was indicated by the thick incrustation of tartar upon it.<sup>2</sup>

The setting of the implanted left middle incisor of the Atacames specimen under consideration (pl. XIX, *e*) is a little larger than that in the right tooth, being a slightly irregular disc, 6.5 mm. in diameter, while the other inlay, a perfect disc, is only 5 mm. in diameter. The smaller disc, however, is slightly thicker than the larger one, being less than .5 mm. in thickness, the other being but .3 mm. The surfaces of the inlays are flat and polished. The larger one projects below the edge of the central part of the tooth, and viewing at it from the inside (pl. XIX, *f*), it appears to have been filed, and thus decorated before the insertion of the inlay. It is extremely

<sup>1</sup> See first entry in the bibliography of Dr Andrews, under date of 1893.

<sup>2</sup> See second entry in the bibliography of Dr Andrews, under date of 1893.





SKULL WITH TEETH OVERLAID WITH GOLD, FROM LA PIEDRA, ESMERALDAS, ECUADOR.  
IN THE HEYE MUSEUM

probable that the left lateral incisor and the left canine exhibit decoration by filing (pl. XIX, g, h), and are not naturally worn down. This custom of filing the teeth, a quite common custom in ancient Mexico and Central America, is now found for the first time on the Pacific coast of South America, in case our presumption is correct, although, as has been already stated, Boman has recently reported it from Argentina.

The back teeth are very much worn, evidence that the decorated incisors were carefully taken care of, in order that the implanted tooth and the projecting inlay might not be injured.

A short time before my first visit to Atacames in 1907, a skeleton was found in a burial tube, which had the four incisors and the two canines of the upper jaw decorated with gold inlays. The finder, unfortunately, extracted the settings for the trifling value of the gold, and threw the skull away. I secured these six inlays, and they now form a part of the Esmeraldas collection in the Heye Museum. They are a little smaller than the two in the specimen just acquired, one being 4.5 mm. and the other five 4 mm. in diameter. Several other teeth with gold setting have been found at various times after floods, when the banks of the river were undermined, often uncovering burials. With one exception, outside of our own collection, they have been given away as curiosities. The exception noted is a fragment of a skull found in the early seventies and presented to the late J. S. Wilson. It is now in the British Museum.<sup>1</sup> This skull (pl. XVI, a) formerly contained eight gold inlays in the upper jaw, decorating the four incisors, the two canines, and the two bicuspid. Only the settings in the canines and the bicuspid remain, although the cavities in three of the incisors are found, while one of the incisors is missing.

We know, then, that the number of the teeth to be decorated was variable. Our examples have two and six, while the British Museum has eight inlays, the latter number being the extreme

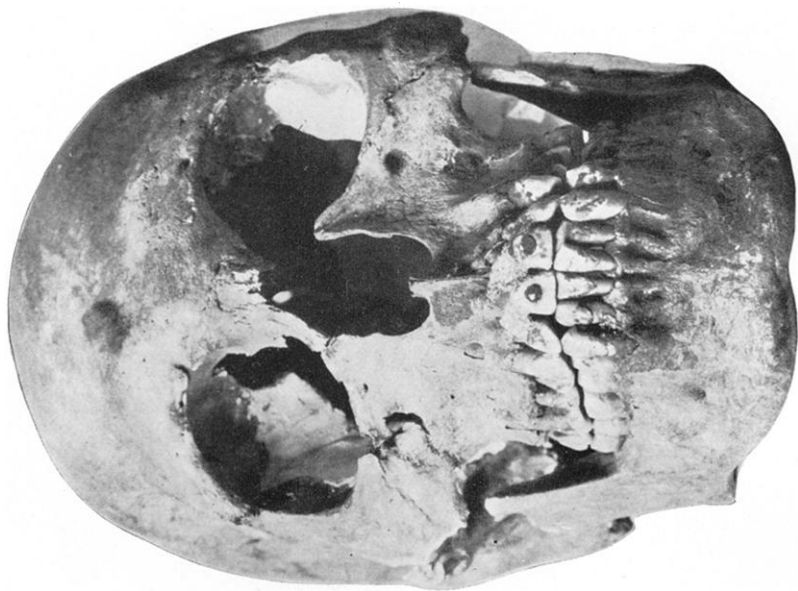
<sup>1</sup> A drawing of this skull has recently been published in the *Short Guide to the American Antiquities in the British Museum*, written by Mr Joyce. See entry in the bibliography under date of 1912. I obtained a photograph of this specimen in 1895, which has been reproduced for several years among the plates of my unpublished work on the archeology of Esmeraldas.

found by us in a skull from a tomb in the ruins of Copan, Honduras, where, however, the setting was of jadeite. It may be observed here that gold as an inlay has never been found thus far to our knowledge in North America or in South America outside of the Esmeraldas coast region. From Tomsupa, a few miles north of Atacames, we have two gold discs, one 4 mm. and the other 4.5 mm. in diameter, which are without doubt inlays from teeth. From La Tolita, more than a hundred miles to the north, we have numerous gold discs, of about the size of the Atacames specimens, which are probably inlays, but thus far, in the extensive diggings that have been carried on there in search of gold, no skulls with decorations have been found. I believe that when careful excavations are made in the many mounds on the island, skulls having gold decorations will be discovered. It is a curious fact that we do not find any indication of this type of facial decoration in any of the hundreds of pottery heads from La Tolita, but in reality our hasty survey of this area is hardly a scratch on the surface of this important archeological field.

By far the most transcendent example of teeth decoration which has at present come to light in America is in a skull discovered in 1909 at a place called La Piedra, near the point on the right bank of Esmeraldas river where it empties into San Mateo bay. It was accidentally found by Mr Pinzon and Mr George D. Hedian, the latter the American consular agent at Esmeraldas, and was kindly presented to me by Mr Hedian for the Heye Museum during my visit to Ecuador last summer. The skull was seen projecting from the bank, but no other parts of the skeleton were uncovered, probably having been washed away after the bank was undermined. The upper part of the skull is in fragments, but is restorable. The upper and lower jaws are somewhat flattened, having been crushed by the weight of earth, and still remain with the mass of earth in which they were imbedded (see pl. xvii, and fig. 57). The skull, slightly deformed, is that of an adult female. The decoration of the teeth is unique and presents a new type of facial ornamentation. Instead of small discs being set into artificial cavities, we find in this case, as shown in plate XIX, *c*, that certain teeth of the



A. SKULL WITH FILED TEETH IN UPPER AND LOWER JAWS, FROM MOUND 6, RUINS OF LABNA, YUCATAN. IN THE PEABODY MUSEUM OF HARVARD UNIVERSITY



B. SKULL WITH TEETH INLAID WITH JADEITE, FROM CHALCHICOMULA, PUEBLA, MEXICO. IN THE ETHNOGRAPHICAL MUSEUM OF MUNICH

upper jaw were almost entirely covered on the outer face by an *overlay* of gold. The entire enamel of the teeth decorated has been removed with the exception of narrow bands at the bases and the upper parts where they were close to the flesh and imbedded in the jaw. The removal of the enamel is through to the dentine and was skilfully accomplished. It appears that in some instances sawing was done slightly under the enamel at the upper part, so that the gold overlay, or covering, might be fitted under it in order to make it more secure. In one tooth there is a very tiny ridge on the right side where the enamel was left in a beveled line. The teeth thus practically

"face-crowned" are the four incisors and the two canines. The overlays are missing in all but one of the teeth, the left lateral incisor (pl. XIX, *c*). This gold covering is slightly folded or bent over each side of the tooth for greater security. The overlay measures 5 mm. in height, and has an extreme width of 8 mm. (an average of 7 mm.) on the face, while the clamped or bent-over

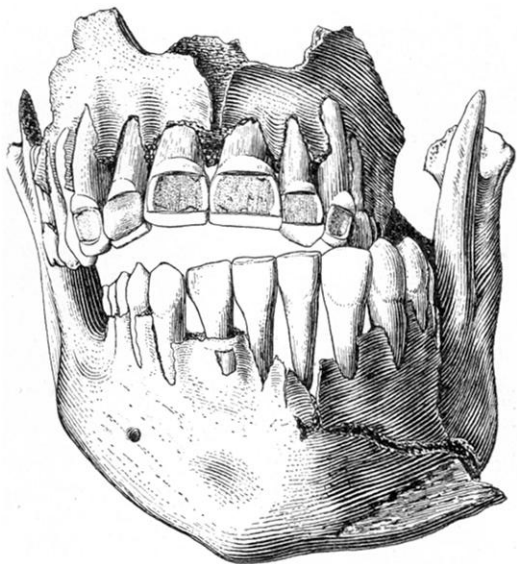


FIG. 57.—Upper teeth ornamented with overlay of gold.

section is too small to be measured. The teeth which have lost the overlays (a front and side view of one is given in pl. XIX, *a*, *b*) show that the cutting extends toward the dentine 1 mm. or a trifle more. In the left middle incisor the vertical cut is 6.6 mm.; the right middle incisor has a vertical cut of 6 mm.; while the canines have 5 mm. In some of the cuts traces of a cement which aided in holding the gold fast to the teeth may still be seen. The

polished surface of the remaining overlay does not come out to the face of the tooth; in other words, the gold is not so thick as the depth of the cut. Unlike the fragment of skull which contains the disc inlays described above, the teeth are not worn down, and are in a splendid state of preservation. The teeth decorated are those which show when the mouth is opened in speaking, and are so covered that they must have had the appearance in life of gold teeth.

This new phase of dental decoration exhibits a skill far in excess of that shown in the simple discs cut out of the enamel for inlays, as the removal of such a large part of the enamel required the most delicate work on the part of the operator so as not to injure the dentine and cause premature decay. Had the gold overlay not been tightly fitted over the exposed dentine, decay likewise would have been rapid, but there is not a trace of decay on the surfaces of the dentine where the overlays have been lost, nor is there any indication that the decoration was not worn for a considerable time during life, and I am of the opinion that the accidental finding of the skull is responsible for the lack of the five overlays, and that they were not lost during life.

One other type of decoration remains to be considered. On the first expedition to Esmeraldas, in 1907, my assistant, Mr Niendorff, was sent on a trip from Atacames southward to the frontier of the province of Manabí. At Tonchigue, a few miles south of Atacames, he made several excavations, and I quote from his report as follows:

One tube, twenty inches in diameter and two feet six inches high, contained a skeleton; the tube stood on an olla overlapping it about two inches. The olla was thirteen inches deep. On top of the tube there had been another tube over-



FIG. 58.—Tooth ornament of gold.

lapping the lower one by about five inches. Being so near the surface, the tube and the olla had been exposed to the elements for so long a time that I could not save the bones. A part of the top of the skull had been bleached white. On either side of the skull I found small pieces of copper wire which had been gilded. They were evidently earrings. Between the two upper front teeth I found a small spoon-shaped piece of gold [see fig. 58], bent around the tooth on the inside.

The teeth and the rest of the skull were so much disintegrated that Mr Niendorff was unable to preserve them. This gold orna-

ment has a small piece broken from it. As shown in the drawing, which is natural size, it is flattened out. It was bent around the tooth with the rounded side out, thus forming a type of decoration combining the disc and the band on the face of the incisor.

In our study of this subject we have found that various methods of decoration were in vogue along the Esmeraldas coast. The most common type was the inlay of small discs; we have also the overlay of gold bands in the enamel; again, as in the Tonchigue example, the binding around the tooth of a convex disc and bands; and, finally, the reported discovery in the thirties of the intertwining or interlacing of gold wire around the teeth. It should also be noted that the decoration was always in the upper teeth, and so far as we now know gold was always used as the material for the inlay. There is also the indication that filing of the teeth was practised.

In order to compare our Esmeraldas specimens with some of those found in Mexico and Central America, there are introduced in plate XIX a few drawings of teeth from this area. They show that in the art of inlaying substances in the teeth, the technique in Central America is identical with that of Esmeraldas. The examples *i* to *m* are inlaid teeth from Mexico and Honduras, exemplifying three different materials used as inlays. *i* is an upper incisor from Yucatan in the Berlin Museum; it has an inlay of turquoise, is not filed, and has a perforation on the side near the upper end of the root for suspension. Example *j* is from Tecolpa, Chiapas, not far from the ruins of Palenque.<sup>1</sup> I collected it in 1897, and it is now in the American Museum of Natural History. It is an upper incisor, has an inlay of jadeite, and is filed at each corner. Specimen *k* is from the ruins of Copan, Honduras; it was found in a tomb which I uncovered in 1892, and is now in the Peabody Museum of Harvard University.<sup>2</sup> This is an upper incisor, and is decorated in the same manner as the tooth from Tecolpa, being inlaid with jadeite and also filed. The tooth shown in *l* is also from Copan; it has an inlay of jadeite, but is filed only on the right corner.

<sup>1</sup> See entry in the bibliography of Troncoso under date of 1893.

<sup>2</sup> See entry in the bibliography under date of 1896.

An upper canine, *m*, is from Xoxo, Oaxaca. In my paper on Zapotecan tombs<sup>1</sup> I have described the finding of this tooth; it was excavated in an enclosure in front of a stone burial chamber in the center of Mound 5, with a number of human teeth which had been thrown in with a mass of other objects. Several of the teeth were ornamented by the insertion of small circular pieces of hematite averaging three-sixteenths of an inch in diameter. Several were also filed, and two had no setting but were filed at the corner. These are all upper teeth. The tooth illustrated has a hematite inlay, but is not filed. This specimen, with two other decorated teeth from the Xoxo tomb, are now in the American Museum of Natural History. The other teeth shown in plate XIX illustrate examples of simple filing. Specimen *n* the writer found in the Cave of Loltun, Yucatan;<sup>2</sup> it exhibits filing similar to that found in the skull which I also discovered in a tomb in the ruins of Labna, Yucatan, while engaged in the work of the Thompson Expedition of the Peabody Museum of Harvard University. This skull has been illustrated by Dr Andrews,<sup>3</sup> but I give here, in plate XVIII, *a*, a front view, as the publications of Dr Andrews are not readily accessible. Teeth *o* and *p* of plate XIX are from a skull illustrated in Strebel's work, and are from Cerro Montoso, Vera Cruz. They exhibit a different style of filing, the first showing the presence of a double serrated edge, while the second has a single serration.<sup>4</sup> All the teeth shown in the illustration are from upper jaws.

In all the examples of skulls with decorated teeth which I have seen, if the style of decoration is that of a simple inlay or a combination of inlay and filing in the same tooth, the teeth of the lower jaw are not decorated. Inlaying is confined strictly to the teeth of the upper jaw. If the upper teeth, however, are only filed, then in a number of instances we find the lower teeth filed with a single or a double serration, as in the examples of upper teeth shown in *n*, *o*, *p*, of plate XIX. Unfortunately, only one of the

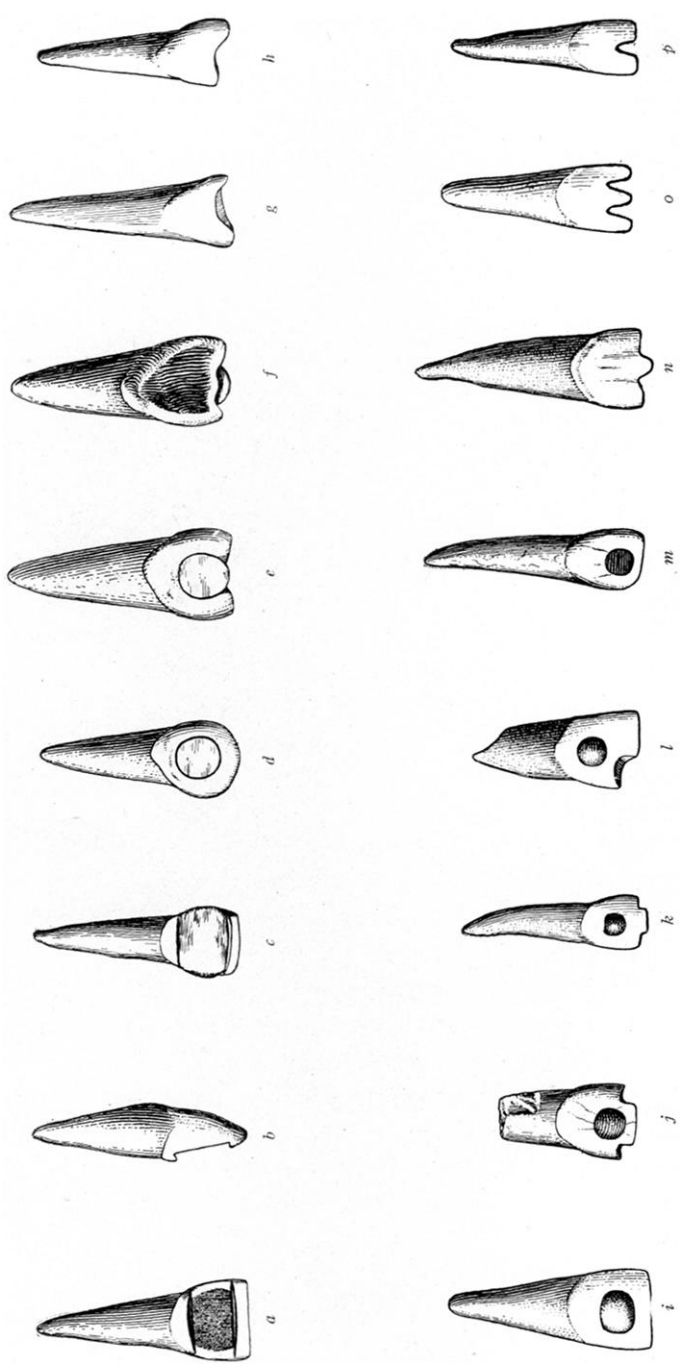
<sup>1</sup> See entry in the bibliography under date of 1899; also the entry of Batres under date of 1902.

<sup>2</sup> See entry in the bibliography under date of 1897.

<sup>3</sup> See entries in the bibliography under date of 1893.

<sup>4</sup> See entry in the bibliography under date of 1885-89. These teeth are found in a skull figured in tome I, pl. VIII, fig. 18.





DECORATED TEETH SHOWING OVERLAY, INLAY, AND FILING

skulls with filed upper and lower teeth which I have seen has all of the teeth in place, namely, the example from Labna, where the six upper teeth, incisors and canines, are filed; and the eight lower teeth, incisors, canines, and bicuspid, are also filed. In other skulls it is impossible to state how many of the lower teeth were thus decorated. In the Mexican and Central American area, what I have written about the variability of the number of teeth to be decorated in Esmeraldas is also true.

In figure 59 is illustrated the fragment of upper maxillary figured by Hamy.<sup>1</sup> It is one of two examples of the kind with inlaid teeth from Mexico which we have ever seen published; other specimens showing this custom are simply isolated teeth separate from the jaw. It is from Campeche, Mexico, and indicates that

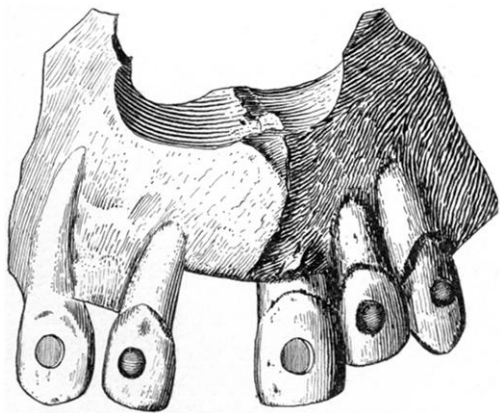


FIG. 59.—Upper teeth inlaid with gold. From Campeche, Mexico. (After Hamy.)

at least six of the teeth were decorated—the four incisors and the canines. The right middle incisor is missing, and the settings of turquoise are lacking in the cavities cut in the left middle incisor and in the right canine.

The other example is in a complete skull from Chalchicomula, state of Puebla, Mexico, which has recently been illustrated by Dr Walter Lehmann; it is now in the Ethnographical Museum in Munich. In this, the only complete skull with decorated teeth which has been published (see plate XVIII, *b*), the two upper incisors are ornamented with small circular inlays of jadeite, somewhat smaller than the average inlays in other decorated teeth which I have examined.

<sup>1</sup> See entry in the bibliography under date of 1882.

Comparing these specimens with our Atacames fragments, the close similarity is evident, especially in the specimen in the British Museum and the Campeche fragment, the inlays in both specimens being of the same size.

I cannot help expressing the opinion that the custom of inlaying teeth as found on the Ecuadorian coast has come directly from Central America, and that future explorations of the George G. Heye Expedition to the north, along the Colombian coast, will probably bring to light other examples of this custom in the region separating the coast of Ecuador from Central America. It would be premature at this time to dwell on the question of a connection between the coast cultures of Ecuador and Central America, but it might be stated, in conclusion, that we have several other points of contact which seem to be indicated in a study of our extensive collections from the province of Esmeraldas. This is a subject which we reserve for consideration in our forthcoming monograph on *The Archeology of Esmeraldas*, which will appear as Volume III of our *Contributions to South American Archeology*.

The interesting questions will be asked, How was the work of cutting the teeth accomplished? and How was the patient able to withstand the pain of the operation done with the most primitive of tools? The only information that sheds light on the first query is found in the work of De Landa, who, writing about the native population of Yucatan, the Mayas, says: "They had the custom of sawing the teeth, leaving them like the teeth of a saw, and this they did for elegance or show; the work was done by the old women, filing them (the teeth) with certain stones and water."<sup>1</sup> This probably explains the process employed by the people of Esmeraldas and Argentina in filing the teeth and in cutting out the enamel for overlays, as shown in La Piedra skull; but, in cutting the cavities for inlay work, stone drills, or perhaps either hollow bone or cane drills, were employed with sand and water. No metal tools have yet been discovered in Esmeraldas or elsewhere in Ecuador by which the work could have been done. All the copper celts and

<sup>1</sup> The work of Diego de Landa, entitled *Relación de las Cosas de Yucatán*, was found and first published by Brasseur de Bourbourg in 1864. I translate from the edition of Brasseur (p. 345) after comparing the paragraph with the text of the two later editions.

axes are large, and we have only a single small copper implement, an awl, from Esmeraldas. We must not forget that to the present time hardly any archeological work has been done in this section of South America. Our own explorations thus far have been little more than a preliminary reconnoissance of the region. Later, tools suitable for the fine dental work exhibited by these specimens may be uncovered by the spade of the investigator. I believe, however, that copper is too soft to have been used successfully for cutting so hard a substance as enamel, hence it is fairly evident that other materials must have been employed as tools by the ancient dentists.

Regarding the other question, as to the ability of the patient to bear the discomfort and pain of the operation, is it not possible that these people had discovered the properties of coca in producing local anesthesia? We know from archeological evidence, which I have brought out in my work on Manabi,<sup>1</sup> that the people of the coast were addicted to the use of coca, chewing the leaves, mixed with lime, exactly as do the Indians of today in a large part of western South America. In view of this fact, it does not seem unreasonable to advance the hypothesis that coca may have been used, in some form, in dental work in this area, where, without question, a little-known branch of the South American Indians reached a high state of aboriginal culture.

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Von Ihering devotes a small space at the end of the paper to the filing and other mutilation of teeth in America.

HAMY, E. T. Les mutilations dentaires au Mexique et dans le Yucatan. In *Bulletin de la Société d'Anthropologie de Paris*, 3<sup>e</sup> série, tome v, p. 679, Paris, 1882.

- 1883 HAMY, E. T. Mutilations dentaires des Huastèques modernes. In *Bulletin de la Société d'Anthropologie de Paris*, 3<sup>e</sup> série, tome vi, pp. 644-645, Paris, 1883.

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<sup>1</sup> See entry in the bibliography under date of 1910. In this volume (pp. 183-187) I have discussed this subject, and in plates LXVII-LXVIII have illustrated some vessels of shell and clay which were used to contain the lime mixed with the masticated coca leaves. These objects were found with skeletons in graves excavated by the George G. Heye Expedition at Cerro Jaboncillo, Manabí.

These studies are republished by Dr Hamy under the title "Mutilations dentaires des Huastèques et des Mayas," in *Décades Américanæ, Mémoires d'Archéologie et d'Ethnographie*, 3d and 4th Decades, xxvii, pp. 88-94, figs. 14, 15, Paris, 1898.

Dr Hamy figures the fragment of an upper jaw of a skull from Campeche which has the teeth inlaid with turquoise.

1885-

1889 STREBEL, HERMANN. Alt-Mexiko, 1885, Tafel VIII, fig. 18; Zweiter Teil, 1889, Tafel IX, fig. 14. Hamburg und Leipzig, 1885-1889.

In the first illustration Strebel gives a skull from Vera Cruz with filed teeth in the upper jaw; in the second plate cited he illustrates a tooth inlaid with obsidian, also from Vera Cruz.

1890 LEÓN, NICOLAS. Anomalías y Mutilaciones Etnicas del Sistema Dentario entre los Tarascos Pre-Colombianos. In *Anales del Museo Michoacano*, 3d year, pp. 168-173, 1 pl., Morelia, 1890.

Illustrates and describes a skull from Michoacan with filed teeth in the upper and lower jaws.

1892 PECTOR, DÉSIRÉ. Notice sur l'archéologie du Salvador précolombien. In *Internationales Archiv d'Ethnographie*, tome V, pp. 112-116, Leiden, 1892.

This paper is a résumé of the work of Montessus de Ballore, *Le Salvador précolombien*, a portfolio of 25 plates published in Paris in 1891. Pector calls attention to what appears to indicate filed teeth in several of the pottery specimens. I fail to find any marked examples of this custom, except in two animal heads in which the teeth are pointed, and in a face, probably representing the mask of Tlaloc, in which two of the teeth are cut. In the human heads nothing of the kind is found.

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1893 PASO Y TRONCOSO, FRANCISCO DEL. Catálogo de la Sección de México, Exposición Historico-Americana de Madrid, 1892, tomo II, p. 381, Madrid, 1893.

Mention is made of the collecting of teeth, filed and inlaid with jadeite, in Tecolpa, Chiapas. In 1897 I collected a tooth of the same character in Tecolpa, which is now in the American Museum of Natural History.

ANDREWS, R. R. Prehistoric Crania from Central America. In *International Dental Journal*, reprint, 4 pp., 1 pl., 4 figs., Boston, 1893.

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In these two papers Dr Andrews figures and describes a skull from Labna, Yucatan, with teeth filed in the upper and lower jaws, and also teeth filed and inlaid with jadeite and a red cement, from Copan, Honduras, all excavated by Saville. These specimens are now in the Peabody Museum of Harvard University.

1896 SAVILLE, MARSHALL H. Prehistoric Ruins of Copan, Honduras. *Memoirs of the Peabody Museum of American Archaeology and Ethnology, Harvard University*, vol. I, no. 1, pp. 30, 32, text figs.

Several of the filed and inlaid teeth are illustrated and the finding of them is mentioned in the report on the excavation of the tombs.

- 1897** THOMPSON, EDWARD H. Cave of Loltun, Yucatan. Report of Explorations by the Museum, 1888-89 and 1890-91. *Memoirs of the Peabody Museum of American Archaeology and Ethnology, Harvard University*, vol. I, no. 2, p. 20, fig. 16.

Illustrates three filed teeth found by Saville, while in charge of the work of the Thompson Expedition, in the Cave of Loltun, Yucatan.

- 1899** SAVILLE, MARSHALL H. Exploration of Zapotecan Tombs in Southern Mexico. In *American Anthropologist*, N. S., vol. I, pp. 354, 361-362, April-June, 1899.

Mentions the finding of filed teeth and teeth inlaid with hematite in a tomb excavated in Xoxo, Oaxaca, by the Loubat Expedition. Several of these teeth are in the American Museum of Natural History, New York.

- 1901** LASCH, RICHARD. Die Verstümmelung der Zähne in Amerika und Bemerkungen zur Zahndeformierung im Allgemeinen. In *Mittheilungen der anthropologischen Gesellschaft in Wien*, Band xxxi, pp. 13-22, Vienna, 1901.

A general treatise on teeth mutilation in ancient America.

- 1902** BATRES, LEOPOLDO. Explorations of Monte Alban, Oaxaca, Mexico, pp. 9-10, fig. 3, México, 1902.

In this account of the explorations carried on at Monte Alban, Batres illustrates a filed tooth inlaid with hematite which he states he found in a crypt in Xoxo. This is not so. The tooth is one of those found by me, and became the property of the Museo Nacional, Mexico City, in the division of the material found by the Loubat Expedition.

LUMHOLTZ, CARL. Unknown Mexico, vol. II, pp. 426-427, 1 ill., New York, 1902.

Lumholtz illustrates a skull with filed teeth in the upper jaw. In exploring an ancient burial place near Zacapu, Michoacan, Lumholtz found a number of skulls with filed teeth in both the upper and the lower jaw. These skulls are in the American Museum of Natural History.

**1907-**

- 1908** CHERVIN, A. Anthropologie Bolivienne. Publication of the *Mission G. de Crequi Montfort et E. Senechal de la Grange*, 3 volumes, Paris, 1907-1908.

In tome III Chervin illustrates a skull with filed teeth from Sayate, Argentina, and also two skulls from the Department of Potosí, Bolivia, which he states have filed teeth. The illustrations are small and do not clearly show this feature. See tome III, pp. 93-98, figs. 29-33, pl. 36, and pl. 81, no. 285, pl. 86, no. 314; also p. 59, fig. 26.

- 1908** BOMAN, ERIC. Antiquities de la Region Andine de la République Argentine et du Désert d'Atacama. Publication of the *Mission Scientifique C. de Crequi Montfort et E. Senechal de la Grange*, tome II, pp. 579-589, pl. XLVII, figs. 113-114, Paris, 1908.

Boman gives considerable attention to the subject of decorated teeth, citing various authorities, and illustrates a skull with filed teeth from northwestern Argentina, collected by the expedition.

- 1909** SAVILLE, MARSHALL H. Archæological Researches on the Coast of Esmeraldas (Ecuador). In *Verhandlungen des XVI Internationalen Amerikanisten-Kongresses*, Wien, 1908, p. 344, Vienna, 1909.

First notice of the finding of skulls with teeth inlaid with gold in Atacames.

- 1910** SAVILLE, MARSHALL H. The Antiquities of Manabi, Ecuador, Final Report. *Contributions to South American Archeology*, vol. II, pp. 8-9, New York, 1910.

- 1912** JOYCE, T. A. A Short Guide to the American Antiquities in the British Museum, pp. 36-37, 1 ill., London, 1912.

Joyce figures a broken skull from Atacames, Ecuador, with the teeth inlaid with gold. The photograph which we reproduce in this paper was taken for the author in 1895.

LEHMANN, WALTER. Berichte des K. Ethnographischen Museums in München, IV (1911), pp. 101-102, Abb. 28, Munich, 1912.

Lehmann figures and describes a skull with two teeth inlaid with jadeite. He also calls attention to several other instances of decorated teeth but gives no general account of the subject.

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